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Feral Hog Population Growth, Density and Harvest in Texas

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Photo courtesy Jared Timmons, Texas AgriLife Extension Service

Feral hogs (*Sus scrofa*) are non-native, highly adaptable, and cause significant ecological and economic damage in Texas.

Cover photo courtesy Texas AgriLife Extension Service

Figure 1. Feral hogs are known for their rooting behavior, as they forage for food. The destructive nature of this act can be devastating to pastures, row crops, and wildlife habitat. (Photo courtesy Jared Timmons, Texas AgriLife Extension Service)

Feral Hog Population Growth, Density and Harvest in Texas

The Issue

Domestic pigs were introduced to North America into what is now the United States in the 1500s. They were beneficial to early explorers and settlers because of their importance as a reliable meat source and their hardiness in adverse environments. Domestic pigs were either held in pens or allowed to free-range to forage. Pigs escaping from these practices lead to the initial establishment of wild populations and more recent translocations for hunting purposes led to further establishment of wild populations, which today threaten agricultural production, native wildlife, and water quality. As feral hog populations continue to spread, agricultural and environmental damage has increased (Figure 1). Feral hogs cause at least $52 million in agriculture losses each year in Texas. This free-ranging, non-native, invasive species exhibits the highest reproductive capability of any hoofed animal, which makes population reduction difficult.

Population Growth and Density

Population dynamics (i.e., survival, reproduction, density, etc.) of feral hogs is poorly understood. Often, the number of feral hogs are reported from 1 to 4 million in Texas. These estimates are not based on scientific studies. However, the number of feral hog observations and increased damage reported throughout Texas suggests the state-wide population is growing and expanding its range. Here, we assess population attributes and suitable habitat to better understand the extent of the feral hog epidemic and action required to reduce their impact to agriculture and wildlife management.

Population Factor	Range	Average
Reproductive maturity age	5-14 months	8 months
Number of litters per year	0.84 – 2.0	1.5
Piglets per litter	3.3 – 8.0	5.64
Juvenile to adult ratio	0.52 – 0.75	0.68
Male to female sex ratio	0.38 – 0.64	0.5

Table 1. Demographic estimates used in developing the feral hog population model were derived from 21 scientific studies.

Evaluating Feral Hog Population Growth Rates

A review of 21 scientific studies conducted throughout the southeastern United States provided reasonable estimates of characteristics like survival, litters/year, low, average, and high litter size estimates (Table 1). A state-wide, mathematical model of feral hog populations was developed using averages of these sex, age and reproductive characteristics. Results generated by this model were compared to three independent, state-wide data sources that provided population trend information for feral hogs. Sources included: (1) reported harvest numbers from Texas Parks and Wildlife Department (TPWD) aerial permit holders, (2) feral hogs sold to processing plants for consumption, and (3) United States Department of Agriculture-Animal and Plant Health Inspection Service Wildlife Services agency harvest estimates.

Crude Density Estimates for Feral Hogs State-wide

A comprehensive literature review resulted in eight feral hog studies reporting hog densities from various regions in Texas. From this review, an overall state-wide density estimate was determined. However, the relative density of feral hogs will be different in various areas throughout the state, mainly due to variable habitat conditions. Therefore, we further refined this estimate based on the amount of potential/available feral hog habitat throughout the state. Potential feral hog habitat was identified through the use of a Geographical Information System (GIS) mapping system, based on National Land Cover (i.e., vegetation types) and average rainfall. Within the vegetation cover layer, areas unlikely to support high densities of feral hogs were omitted. For example, water, barren ground, and locations with high human development were excluded. Areas receiving less than 20 inches of annual rainfall were also omitted as suitable feral hog habitat; with the exception of riparian areas (creeks). From this analysis we estimated approximately 134 million acres of suitable feral hog habitat, or 79% of the state (Figure 2).

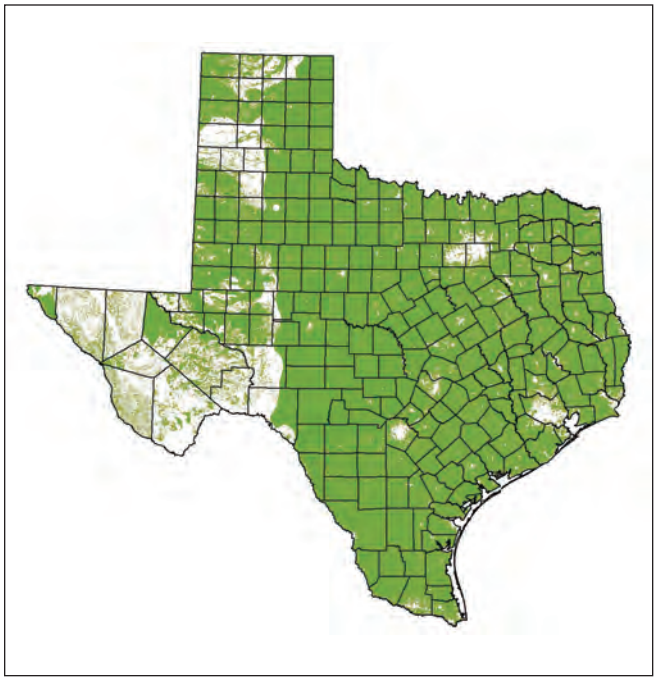

Figure 2. Areas shown in green indicate suitable habitat for feral hogs, comprising 79% of the land mass in Texas.

Research Findings

The population model estimated 18-21% annual population growth, whereas all data sources varied between 19-25%, with an average of 21% (Figure 3). Observed increases in state-wide feral hog trend data were similar to the other model population trajectories, suggesting model results were reasonable and supported characteristics used in model construction.

The average feral hog density in Texas ranged from 8.9-16.4 hogs/square mile from reported studies. By multiplying the density estimate to the total potential suitable feral hog habitat, we estimated the number of feral hogs statewide to be between 1.8 and 3.4 million, with the average being 2.6 million.

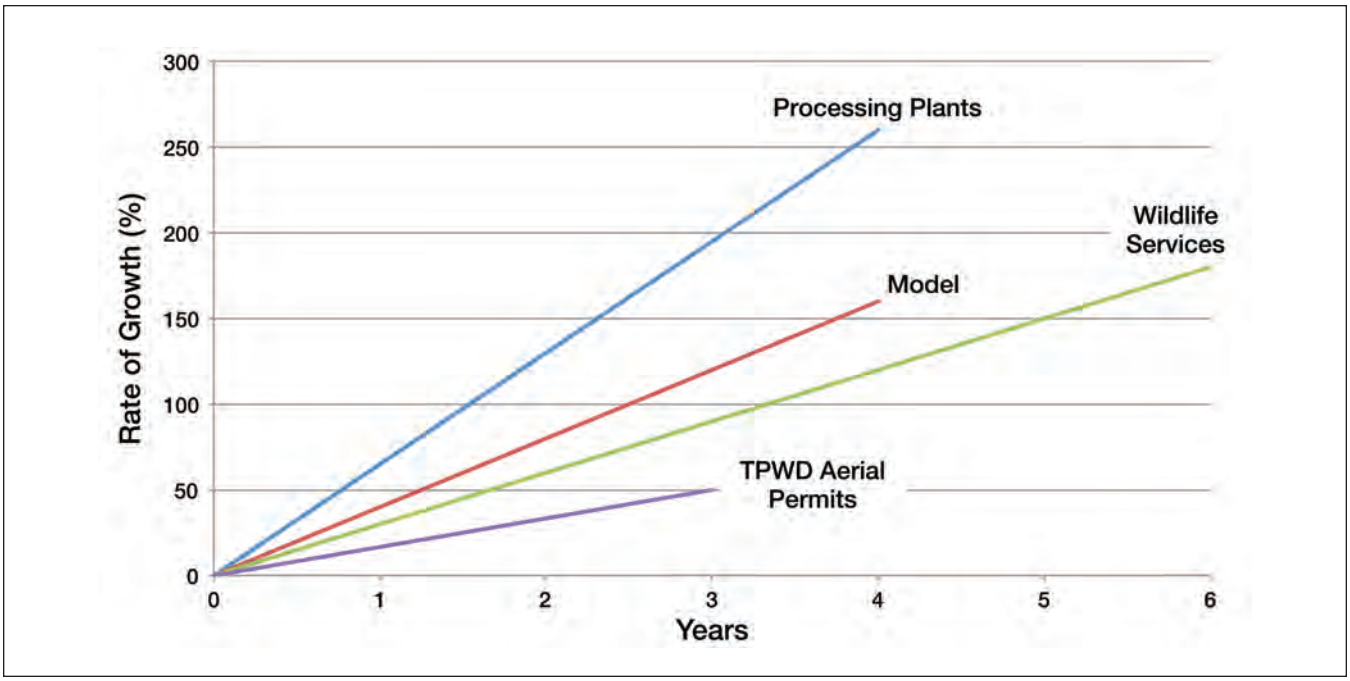

Figure 3. Feral hog growth rates over time as predicted by processing plant, population model, Wildlife Services, and reports from TPWD.

Feral Hog Harvest Survey

Between March 1 and May 31 2011, Texas AgriLife Extension Service county extension agents queried landowners using mail surveys and at extension educational programs. They posed the following questions: (1) whether or not feral hogs were removed from their properties during 2010, (2) if feral hogs were removed, how many were removed and by what methods, and (3) what is the property acreage and location?

Feral hogs captured in a corral trap (Photo courtesy Dr. Jim Cathey, Texas AgriLife Extension Service)

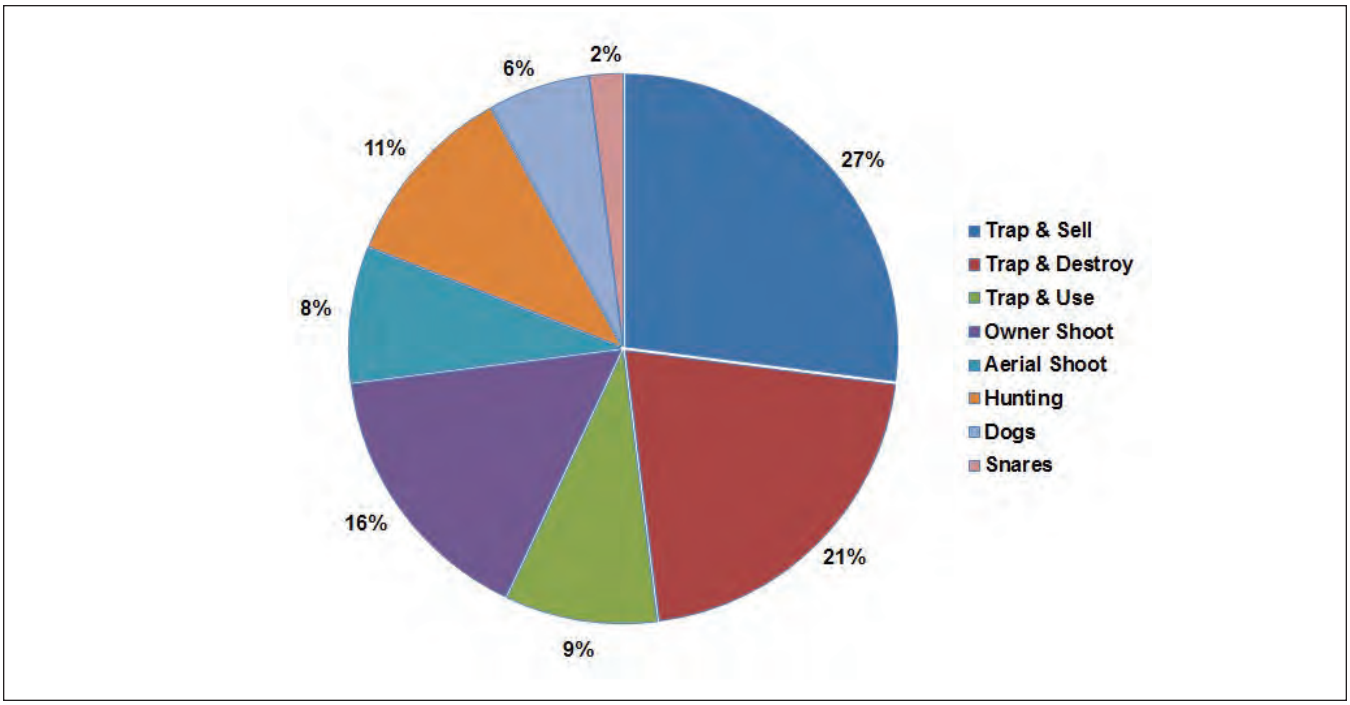

Figure 4. In 2010, 679 survey respondents reported they removed and/or used 36,646 feral hogs by trapping, shooting, and use of dogs and snares.

Six hundred ninety-seven landowner surveys were returned providing data from 139 of 254 counties from properties totaling approximately 1.8 million acres in Texas. Eighty percent of the respondents removed feral hogs from their properties during 2010. Cumulatively, they removed 36,646 feral hogs. Among this group, trap and sell accounted for the most harvested feral hogs (27%), followed by trap and destroy (21%), owner shooting (16%), hunting (11%), trap and use (9%), aerial shooting (not by Wildlife Services) accounted for 8%, dogs (6%), and snares 2% (Figure 4).

Data from the Texas Department of Agriculture on the number of hogs sold to processing plants from 2004-2008 was used to adjust all other estimates. An estimate for the harvest in 2010 was 753,646 or 29% of the estimated feral hog population in Texas. The population model indicated that without harvest the feral hog population was expected to triple within five years (3.33 times initial population), with a 28% annual growth rate. With low harvest (15% of the population) the model indicated that the feral hog population was expected to increase 2.51 times within five years, with an annual growth rate of 22%. Further, with an average harvest of 28% of the population, the feral hog population was expected to double every five years (2.02 times initial population), with a 16% annual growth rate. The population model indicated that with a high harvest of 41% of the population the feral hog population was expected to increase 1.63 times within five years, with a 12% annual growth rate. The model suggested an annual harvest of 66% was required to hold the population stable (Table 2).

Management Implications

With these improved feral hog population estimates, natural resource agencies and landowners can better understand the scope of the feral hog problem in Texas. The population model was beneficial in measuring population growth and evaluating the potential effect of various levels of feral hog removal. Currently, management and control efforts are focused on reducing damage (e.g., economic impacts), not on eradication. Population reduction measures need to increase dramatically, as the estimated harvest rate is only 29% but up to 66% of the population will need to be removed annually on a long-term basis (i.e., five years or more) to reach a stable population. Obviously, feral hog harvest needs to increase substantially, and control methods need additional evaluation to increase harvest thereby reducing economic and ecological damage.

Initial Population of Feral Hogs	Annual Population Growth Rate	Annual Population Harvest Rate	Five Year Population Increase	Five Year Outcome
2,600,000	28%	0%	8,658,000	Population increases 3.33 times
2,600,000	22%	15%	6,526,000	Population increases 2.51 times
2,600,000	16%	28%	5,252,000	Population increases 2.02 times
2,600,000	12%	41%	4,238,000	Population increases 1.63 times
2,600,000	0%	66%	0	No population growth

Table 2. Given an average population of 2,600,000 feral hogs, an even sex ratio, levels of annual population growth and harvest, the model indicates growth or no growth over five years. As annual population harvest increases annual population growth decreases.

Although the model was meant for broad scale, state-level assessments, those worried about feral hogs at finer scales can evaluate what they face. For instance, many people recognize a need to reduce feral hogs particularly near watersheds, as feral hogs can contribute fecal coliforms, including *Escherichia coli*, to waterways. This could harm aquatic life and restrict outdoor recreation associated with impaired streams. For example, the Plum Creek Watershed located in Caldwell, Hays, and Travis counties was listed on the State of Texas 2004 303(d) List of Impaired Waters due to elevated bacteria levels. To alleviate problems associated with bacterial impairments a watershed protection plan was created by Plum Creek Watershed Partnership stakeholders. The plan called for feral hog removal along with other reduction methods. By using the population model created in this investigation, conservation planners like those in the Plum Creek area can better recognize the required number of hogs harvested to limit the population and hopefully have a positive influence on improved stream health.

See other feral hog resources at http://agrilifebookstore.org.

- L-5523 Recognizing Feral Hog Sign
- L-5524 Corral Traps for Capturing Feral Hogs
- L-5525 Box Traps for Capturing Feral Hogs
- L-5526 Placing and Baiting Feral Hog Traps
- L-5527 Door Modifications for Feral Hog Traps
- L-5528 Snaring Feral Hog
- L-5529 Making a Feral Hog Snare
- ESP-419 Feral Hogs Impact Ground-nesting Birds
- ESP-420 Feral Hog Laws and Regulations
- ESP-421 Feral Hogs and Disease Concerns
- ESP-422 Feral Hogs and Water Quality in Plum Creek
- ESP-423 Feral Hog Transportation Regulations
- L-5533 Using Fences to Exclude Feral Hogs from Wildlife Feeding Stations
- SP-467 Feral Hogs Negatively Affect Native Plant Communities

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